MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 2, 2018/2019

EEL2026 – POWER TRANSMISSION AND DISTRIBUTION

(LE)

14 MARCH 2019
9.00 am – 11.00 am
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 4 printed pages (including cover page) with 5 Questions only.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

Question 1

(a) State any *three major advantages* and *disadvantages* of d.c. transmission.

[6 Marks]

(b) State *True* or *False*

(i) Overhead power transmission is much expensive than underground transmission.

[2 Marks]

(ii) For short transmission lines, the effect of capacitance is normally neglected, and

[2 Marks]

(iii) Bundled conductors reduce inductive reactance.

[2 Marks]

(c) A completely transposed three-phase 50-Hz line has the conductor configuration as shown in Fig. Q1. Given that the diameter of all the conductors, d is 0.635 cm.

Determine (i) the line to neutral inductance, and

[6 Marks]

(ii) its associated inductive reactance.

[2 Marks]

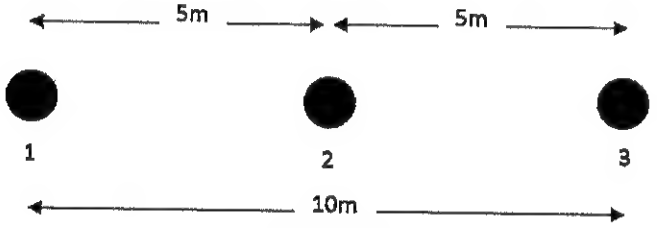

Fig. Q1

Question 2

(a) What is the effect of the earth on the capacitance of a transmission line? Suggest a method of reducing the effect of earth on the capacitance of transmission lines.

[6 Marks]

(b) A 500-kV three-phase transposed line composed of one ACSR conductor with a diameter of 3.42 cm per phase as shown in Fig. Q2. Find the capacitance per phase per kilometer of the line.

[7 Marks]

Fig. Q2

Continued.....

(c) The line in Fig. Q2 is replaced by a bundled conductor consisting of two conductors with diameter of 2.48 cm. The distance between the conductors in the bundle is 45 cm. Calculate the capacitance per phase per kilometer.

[7 Marks]

Question 3

(a) How do you classify a transmission line based on its length?

[3 Marks]

(b) A 220-kV, three-phase, 50-Hz transmission line is 40 km long. The resistance per phase is 0.15 ohm/km and the inductance per phase is 1.593 mH/km. Find the voltage and power at the sending end, the voltage regulation and efficiency when the line supplying a three-phase load of

(i) 381 MVA at *0.8 power factor lagging* at 220 kV, and

[9 Marks]

(ii) 381 MVA at *0.8 power factor leading* at 220 kV.

[8 Marks]

Question 4

(a) Why suspension type insulators are preferred in transmission line with voltage levels above 66 kV?

[5 Marks]

(b) What is a guard ring and its purpose?

[4 Marks]

(c) A string of 5 suspension insulators (Fig. Q4) is to be graded to obtain uniform distribution of voltages across the string. If the pin-to-earth capacitances are all equal to C and the pin-to-pin capacitance of the top insulator is 10C, find the capacitances of each unit.

[11 Marks]

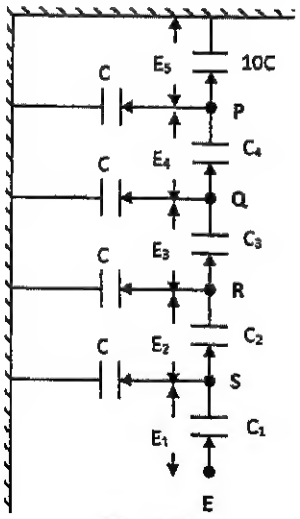

Fig. Q4

Continued.....

Question 5

(a) A short 3-phase line with an impedance of (6 + j8) Ω per line has sending and receiving end line voltages of 120 kV and 110 kV respectively for some receiving-end load at a power factor of 0.9 lagging. Find the active power and the reactive power at the receiving end.

[8 Marks]

(b) A single-phase distribution system supplies four loads as shown in Fig. Q5. Determine the following:

(i) Active power supplied by the transformer,

[6 Marks]

(ii) Reactive power supplied by the transformer, and

[3 Marks]

(iii) kVA rating of the transformer

[3 Marks]

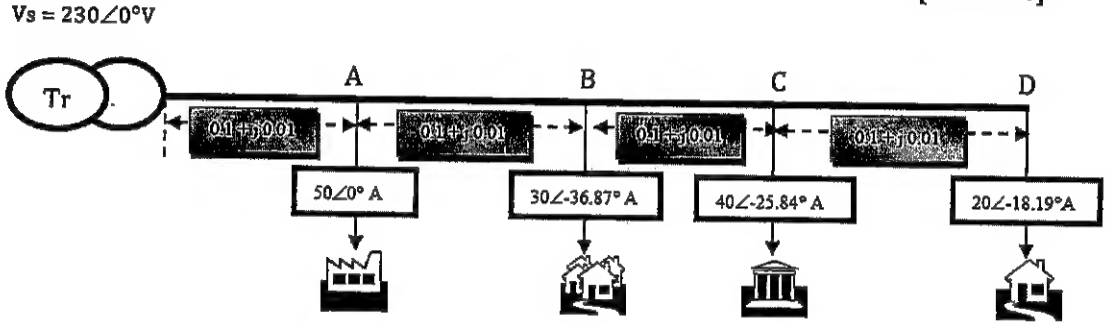

Fig. Q5

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